

Course Syllabus- Biology 343/343L- Comparative Physiology Spring Semester 2011

Instructor: Dr. Scott Parker

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Office Hours: Monday 10:30-1:30, Tuesday 2-4, Wednesday 1:30-4:30, Thursday 2:00-4:00, or by appointment

Class Meeting Time and Location: Lecture: Tuesday, Thursday 12:15-1:30, SCI 114
Laboratory: Friday, 11:00-1:50, SCI 202

Required textbook: *Animal Physiology*. Hill, Wise and Anderson. 2nd ed. Sinauer Associates, Inc.

Supplemental reading material (Note: this is not a requirement): Any comprehensive “freshman” biology text, and/or any recent human anatomy and physiology text.

Course description: Bio 343- Comparative animal physiology lecture: (3) (Prereq: Biology 122 or Marine Science 302 and Chemistry 331 or permission of instructor) (Coreq: Biology 343L) The comparative study of the origins, relationships, and functions of physiological mechanisms in vertebrate animals. Three lecture hours per week. S. Bio 343L- Comparative Animal Physiology laboratory: (1) (Coreq: Biology 343) Laboratory exercises to accompany Biology 343. Three laboratory hours per week. S.

Objectives: We will use a comparative approach to examine the physiology of animals including major physiological systems, with an emphasis on vertebrates. Topics to be covered include metabolic, temperature, osmotic and ionic regulation; respiration and circulatory transport, digestive, muscle, nervous, and locomotor systems; endocrine regulation and biological rhythms. We will further examine how physiological systems are integrated and thus allow animals to respond, physiologically, in different environments.

Student Learning Outcomes:

After completing this course, students should be able to:

1. Develop critical thinking skills and be able to apply physiological concepts and principles at the basic and applied levels.
2. Develop a working knowledge of the major physiological systems, and be able to associate anatomical areas with their specific function.
3. Develop an understanding of the role of evolutionary processes (e.g. natural selection) in driving the organization of physiological systems.

4. Understand important physiological challenges animals face, how those challenges vary in relation to the animals' environment, and the processes by which animals deal with these challenges.
5. Identify and describe structural differences of major physiological systems that characterize different taxonomic groups of animals.
6. Relate physiological processes, from the biochemical to the system level, to the function of the entire organism in its environment.
7. Develop an understanding of current research topics in animal physiology using the primary literature and to develop research questions and methodology to address these questions.
8. Develop research questions, devise methods to answer these questions, apply appropriate statistical tests to analyze data and present results of graphically, through writing and by other means.
9. Learn to properly and safely use animals and modern laboratory equipment to conduct physiological research.

Evaluation:

Midterms: **First exam 20%; Thursday, 24 February**
 Second exam 20%; Tuesday, 5 April

Final exam: **Comprehensive, 25%; 1:30 pm, Thursday, 5 May**

Exam make-up policy: Exam dates may not be changed unless you receive prior approval by me. Make up exams are only given for university-approved absences. Please see the CCU 2010-2011 Catalog p. 41 for specific information. If you miss an exam without a prior approved excuse YOU WILL NOT BE ALLOWED TO TAKE THE EXAM. If you miss an exam due to an emergency and are unable to contact me, you must provide a legitimate note from a physician, counselor, emergency-responder (e.g. police, fire, tow-truck), or other person of official capacity. Please note: missing an exam due to sleeping through a clock alarm is not a valid excuse.

Paper Discussion 1: 5%

Paper Discussion 2: 5%

Paper Discussion 3: 5%

Writing assignments: 20% (**Please note: writing assignments are equivalent to one midterm exam. Take them seriously**)

Exams: Exams are mandatory and will include all material covered in class up until the exam date. Format of exams can include: essays, short answer, true/false, multiple choice, fill in the blank, math problems, drawings, graphs and just about any other type of test question. **The final exam is cumulative.**

Paper discussion: I will assign three journal articles over the course of the semester for you to read. I will post the papers on Blackboard approximately one week before the

class discussion. Your grade will be based on how well you are able to answer questions about the paper, vocabulary within the paper, and effort during the discussion.

Writing assignments: Short writing assignments that address the various topics/concepts covered will be given at various times throughout the course. These writing assignments may consist of worksheets, short handwritten problems/questions, or short written assignments (typically no more than two pages in length, double spaced with 1” margins). The purpose of these short assignments are twofold: 1) they will help me determine which concepts students may be having trouble with, and, 2) it will help you keep actively engaged in the material as we cover it.

Determination of Grade: The final grade will be assigned based upon the percentage of the total points earned. If you score in the ranges listed below you are assured getting at least the letter grade shown. It is possible that the scale could drop, but you are promised that it will not be raised. **NO EXTRA CREDIT ASSIGNMENTS WILL BE GIVEN ON AN INDIVIDUAL BASIS.** Extra credit may be given to the class as a whole.

Assignment	Points
Exam 1	200
Exam 2	200
Final exam	250
Paper disc 1	50
Paper disc 2	50
Paper disc 3	50
Writing assign	200
Total	1000

Grade	%	Earned Points
A	90-100	899.5-1000
B+	87-89	869.5-899
B	80-86	799.5-869
C+	77-79	769.5-799
C	70-76	699.5-769
D+	67-69	669.5-699
D	60-66	599.5-669.5
F	< 60	< 599

Returned assignments: I will do my best to return all assignments in a timely fashion. If you have a question about a returned grade, you must notify me within **TWO WEEKS** of having received the returned assignment/quiz/exam. After two weeks, all grades will be considered final.

Policies:

My goal is to foster an active learning environment. To achieve this goal, I ask that you refrain from engaging in conversation during lecture. Try to avoid being late to class, however, should you have to arrive late, please find a seat near the entrance where you entered the classroom. Similarly, if you have to leave early, please sit near an exit so that your departure does not disturb the class. **Also, as a courtesy to all of your colleagues, please turn off all cell phones while class is in session. Just to be clear this means NO TEXTING!**

Academic dishonesty- I view students as junior colleagues and as such I expect that you will maintain the highest standards of academic integrity. Each student is expected to do their own work on all assignments and examinations. Copying another’s work,

plagiarism, and any other forms of academic dishonesty will result in a 0 for the assignment. Any students involved in copying or cheating on an exam will receive an F for that exam. A copy of the student code of conduct is posted on the Blackboard website, and can also be accessed using the following web address:
<http://www.coastal.edu/conduct/documents/codeofconduct.pdf>

Attendance (student)- As life scientists, I assume that you are invested in your own education and are enrolled in this course because you want to be here. Consequently, attendance is not mandatory, but it is expected. I will take attendance daily (although it does not count towards a grade) to comply with federal financial aid regulations. Please understand that if you want to do well in the course you will need to attend class regularly and on time. As an additional incentive, writing assignments may be given on an impromptu basis so if you miss class you may very well also lose easy points on simple writing assignments.

Attendance (mine)- I know that your time is important so I will do my utmost to begin class on time. I don't plan on being late but in the unlikely event that I am late and unable to provide prior notification, students are expected to wait 15 minutes before leaving the classroom.

Blackboard Site: All reading assignments, text of handouts and individual grades will be available on this site. The Blackboard website may be accessed at
<http://www.coastal.edu/blackboard/>

Disability Accommodations: Accommodations are available for all students who have a disability that may prevent him or her from fully demonstrating their ability. Please let me know of any accommodations that you may need for this course as soon as possible. Please contact Counseling Services: <http://www.coastal.edu/counseling/> to assess your disability and provide you with the necessary documentation that you will then pass on to me. Counseling Services can be reached at (843) 349-2305. The office is located at 204 University Blvd in the Student Health Services/Counseling Services Building.

Some suggestions for how to do well in the course:

- We will be covering a lot of material over the semester so it is crucial to stay actively engaged and not get behind. I recommend studying at least some every day and most importantly, if you do not understand something, make sure to come see me for help.
- **Attend Class Regularly:** One of the most important factors determining success of students in BIOL 343 is daily class attendance. Without exception, students who do not attend class regularly do much more poorly than students who attend class.
- If possible, form study groups with your colleagues. Talking about physiological concepts and processes with others will help show you where your strengths and weaknesses lie and also help to increase your understanding of the material.

- Rewrite and clarify any parts of your lecture notes as needed. If you read through your notes and something does not make sense please ask me.
- Exams are based on material that we cover in class. I will use examples and material from the textbook to support the lectures but I will also use material from outside sources. The textbook should be used as a resource to compliment the lectures. Use the text to clarify and add context to material that you might not understand or that was only covered briefly during lecture.
- The evening or morning before class, skim the relevant areas of the textbook. By skimming the topics in the text prior to class you will be familiarized with the material and you will get a lot more out of the lecture.
- In science details matter. The material covered in the course will range from relatively broad concepts to understanding of specific mechanisms and metabolic pathways. If you are unsure of how best to study or what details are important please ask.
- As much as you can help it, do not try to “cram” for exams in this course. Try to get a decent amount of sleep before the exam.
- Always feel free to ask questions and please come see me if you need help or even if you are just curious about something that we talked about in lecture or lab.

Schedule of Topics (NOTE: this schedule is tentative)

<u>Date</u>	<u>Topic</u>
11- Jan	Course overview, administrative issues, themes in physiology, animal form and function (Ch. 1)
13-Jan	Homeostasis, acclimatory and evolutionary processes (Ch. 1), approaches to studying physiology (Ch. 3, pp 71-78)
18-Jan	Gas exchange and physiology of ventilation: respiration in water vs. air, respiratory organs, ventilation in aquatic environments (Chpts. 21, 22)
20-Jan	Ventilation in amphibians, reptiles, and birds, and mammals (Chapt. 22)
25-Jan	Ventilation in birds and mammals (Chapter 22)
27- Jan	Oxygen and carbon dioxide transport, anatomy and physiology of the circulatory system: (Chpts. 23)
1-Feb	Hemodynamics and Angiogenesis
3 Feb	Circulatory system: Fish, amphibians, reptiles, birds, and mammals; (Chapt. 24)
8 Feb	Food, nutrition, digestion (Ch 5)
10 Feb	Digestion continued
15 Feb	Digestion continued
17 Feb	Energy metabolism (Ch 6)
22 Feb	Aerobic and anaerobic metabolism, exercise physiology (Chapt 7)
24 Feb	Midterm Exam I
1 Mar	Energetics of locomotion (Chpts 8)
3 Mar	Muscle and movement (Ch. 18, 19)
8 Mar	Thermal relations: Temperature adaptation; thermoregulation; (Chpts. 9)
10 Mar	Thermal physiology (continued)

- 22 Mar Nervous systems (Ch 11, 12)
- 24 Mar Nervous systems and sensory physiology (Chapters. 11, 12, 13)
- 29 Mar Biological clocks (Ch 14), physiology of sleep (time permitting)
- 31 Mar Endocrine and neuroendocrine physiology (Ch. 15)

5 Apr Midterm Exam II

- 7 Apr Reproductive physiology (Ch 16, time permitting)
- 12 Apr Osmoregulation: aquatic and terrestrial animals (Chapters. 26, 27)
- 14 Apr Nitrogen metabolism and nitrogen excretion in invertebrates (Chapters. 28,29)
- 19 Apr Nitrogen excretion and kidney function amphibians, reptiles, birds (Chapters. 28, 29)
- 21 Apr Kidney function mammals (Ch 28)
- 26 Apr Hormonal control of kidney function (Chapters 28)
- 28 Apr Catch-up and review

5 May (Thursday) FINAL EXAMINATION (1:30 pm)

Comparative Animal Physiology Laboratory-Spring 2011

(Please note: this is schedule may be subject to change)

<u>Date</u>	<u>Topic</u>
14-Jan	Introduction, administrative issues, lab safety, hypothesis testing, data presentation No Lab
21 Jan	Mammalian Diving Reflex
28 Jan	Differential Membrane Permeability of Mammalian Erythrocytes
4 Feb	Fish on Prozac: physiological basis of aggressive behavior
11 Feb	Neurogenic heart function
18 Feb	Myogenic heart function
25 Feb	Metabolism I
4 Mar	Metabolism II
11 Mar	Metabolism Discussion
25 Mar	Frog Sciatic Nerve Function
1 Apr	Hormonal regulation of amphibian development I
8 Apr	Hormonal regulation of amphibian development II
15 Apr	Presentations
22 Apr	Student Holiday-NO CLASSES

Laboratory grade

Lab Write-ups (variable number)	25%
Lab notebook	50%
Presentation	25%

Letter grades for the lab are assigned as a percentage basis as follows:

90-100%	A
87-89%	B+
80-86%	B
77-79%	C+
70-76%	C
67-69%	D+
60-66%	D
< 60%	F

Please note: NO MAKE UP LABS ARE POSSIBLE!! NO EXCEPTIONS

Notice of live animal use: Experiments in BIOL 343 laboratory will often involve the use of live animals. While maximum effort has been made to use non-invasive, non-lethal procedures, there is no better way to fully appreciate and understand the physiology of animals than by studying their function first hand. Computer simulations simply cannot mimic the integrated function of a living animal. If you have objections to carrying out experiments on live animals then I would recommend not taking this course. **No substitute assignments will be made for individuals who choose not to participate in laboratory experiments. If you voluntarily choose to not participate in a laboratory experiment, then you will receive a "0" for that assignment.**

Lab Write-ups- A selected number of laboratory experiments will be written-up in the style of a scientific journal article. You will receive further information on the specific requirements of a given laboratory in due course. An important component of this laboratory course is learning how to present data obtained from experiments in graphical or tabular format. We will spend considerable time on this topic so that by the end of the course you will be able to independently summarize and present your research data so that it is easily interpretable by readers.

Laboratory Notebooks: Laboratory notebooks are a critical component of any research project. At minimum, information in laboratory notebooks records the purpose, materials and methods, and results of experiments. The notebook provides an important record for you as the researcher as well as other scientists who may be working in similar areas. As you work through an experiment you will record the objective of the experiment, the methods, and results. This record will then be used as the basis of your

formal laboratory write-up. Remember, the laboratory notebook should be organized and sufficiently clear so that an independent scientist generally familiar with the topic can follow your instructions and duplicate the experiment. More information on laboratory notebooks will be provided in a separate handout.

Student Presentations- The presentation is your opportunity to explore an area of physiology that you find interesting and develop a research question and a methodological approach to answer the question. Once you have developed the proposal you will present it to the class in a seminar format using Powerpoint. Presentations should be no more than 12 minutes long in total. At least 10 minutes of the presentation should be devoted to presenting your proposal. Leave approximately 3 minutes at the end for questions. Begin investigating your research question early in the semester. Topics may be any area of physiological research that you find interesting. Your final selected topic will be developed through consultation with me. You will be required to select at least one “older” research paper from the primary literature (i.e. 1985-2000) that you feel exemplifies your question of interest then follow up with a more recent paper (i.e. 2006-2010) that builds up on the earlier study. Your job is to then describe what novel direction you would take the research project and what specific methodologies you would use. In support you will also be required to provide at least 10 additional citations from peer-reviewed scientific literature. The list of citations will be provided to me separately from your presentations.

Legal Caveat/disclaimer: The above schedule, policies, procedures and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better student learning.

Comparative Physiology (BIOL 343/343L) Student Contract

My signature below indicates I have read and understand the syllabus, and I accept the requirements of this course.

Signature: _____

Date: